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FOR

ADVANCED AUTOMOBILE FLOOR MAT

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## ADVANCED AUTOMOBILE FLOOR MAT

### Cross-Reference to Related Applications:

**[0001]** This application claims the benefit under 35 USC section 119(e) of U.S. provisional application 60/427,145, filed November 14, 2002. Further, this application is a continuation-in-part of U.S. application no. 10/631,895, filed August 1, 2003; a continuation-in-part of U.S. application no. 10/436,245, filed May 13, 2003; a continuation-in-part of U.S. application no. 10/395,793, filed March 25, 2003; a continuation-in-part of U.S. application no. 10/316,030, filed December 11, 2002; a continuation-in-part of U.S. application no. 09/985,456, filed November 2, 2001; and a continuation-in-part of U.S. application no. 09/935,672, filed August 24, 2001.

**[0002]** U.S. application no. 10/631,895, U.S. application no. 10/436,245, and U.S. application no. 10/316,030 are continuations-in-part of U.S. application no. 09/935,672, filed August 24, 2001. U.S. application no. 09/935,672 is a continuation-in-part of international application no. PCT/US00/30206, filed November 2, 2000, which is a continuation-in-part of U.S. application no. 09/553,234, filed April 19, 2000 and issued May 22, 2001 as U.S. patent no. 6,233,776. Application no. 09/553,234 is a continuation-in-part of U.S. application no. 09/418,752, filed October 15, 1999 and now abandoned, which is a continuation-in-part of U.S. application no. 09/304,051, filed May 4, 1999 and issued April 24, 2001 as U.S. patent no. 6,219,876.

**[0003]** U.S. application no. 10/395,793 is a continuation-in-part of U.S. application serial no. 09/985,456, filed November 2, 2001. U.S. application no. 09/985,456 is a continuation-in-part of U.S. application no. 09/553,234, filed April 19, 2000 and issued May 22, 2001 as U.S. patent no. 6,233,776.

**[0004]** All of the foregoing applications are fully incorporated herein by reference.

### Background

**[0005]** Automotive vehicle floor mats are known. The floor mats may be arranged in an automotive vehicle such as a car, truck, van, recreational vehicle, bus, airplane, and so on. Typically such floor mats are made of a tough rubber or rubber-like material, and may or may not include a carpet material on an upper surface thereof. The floor mats may collect some dirt that is brought into an automotive vehicle on a driver's or passenger's shoes, but their dirt-trapping ability is limited. Mats without carpeting may trap little if any dirt; instead, dirt may more typically end up on the automotive vehicle's floor, and only be removable by sweeping or vacuuming. Mats with carpeting may do a somewhat better job of trapping dirt, but themselves need to be periodically swept or vacuumed.

**[0006]** In view of the above, improvements in automotive floor mats are needed.

### Brief Description of the Drawings

[0007] FIGs. 1A -1C show an automotive vehicle floor mat according to embodiments of the present invention;

[0008] FIGs. 2A, 2B and 3 show an automotive vehicle floor mat according to embodiments of the present invention, where the floor mat includes a non-tacky area in an insert area thereof;

[0009] FIGs. 4-7 show an automotive vehicle floor mat according to embodiments of the present invention, wherein an insert material thereof has areas of varying tackiness; FIG 8 shows an automotive vehicle floor mat according to embodiments of the present invention, having an offset insert area;

[0010] FIGs. 9A-9B show an insert material in association with flexible protrusions in an insert area of an automotive vehicle floor mat according to embodiments of the present invention;

[0011] FIG. 10 shows an automotive vehicle floor mat according to embodiments of the present invention, wherein an insert area thereof includes anti-slip members;

[0012] FIGs. 11A-11D show a multi-layer insert material according to embodiments of the present invention;

[0013] FIG. 12 shows an automotive vehicle floor mat according to embodiments of the present invention, that includes an overlay for an insert area thereof;

[0014] FIG. 13 shows an automotive vehicle floor mat according to embodiments of the present invention, wherein an insert area thereof is formed as a cut-out;

[0015] FIGs. 14A and 14B show an automotive vehicle floor mat according to embodiments of the present invention arranged in an automotive vehicle; and

[0016] FIGs. 15A and 15B show an automotive vehicle floor mat according to embodiments of the present invention, comprising an attachment mechanism.

### Detailed Description

[0017] Embodiments of the present invention relate to an automotive vehicle floor mat comprising a dirt-trapping insert material. The insert material may have a tacky upper exposed surface for trapping dirt, detritus, dust, debris, leaves or any other kind

of soiling, dirtying, contaminating or otherwise unwanted substance. The insert material may be removably received within an insert area of a base portion of the automotive vehicle floor mat, so that dirt trapped by the insert material can be easily removed from the automotive vehicle without sweeping or vacuuming, by simply removing the insert material from the base portion. In embodiments, the insert material may comprise a plurality of separable, disposable layers or sheets formed as a stack, each sheet having a top tacky surface. Sheets of the tacky insert may be removed and disposed of one by one as they are used over time.

**[0019]** According to further embodiments of the present invention, a non-tacky area may be arranged within the insert area so as to be bordered by or adjacent to the insert material when the insert material is received within the insert area. A location of the non-tacky area may depend at least in part on where a person's feet are likely to be when in an automotive vehicle. Furthermore, embodiments of the invention may comprise an insert material having a surface comprising areas with varying degrees of tackiness, where a degree of tackiness in a given area depends at least in part on where a person's feet are likely to be when in an automotive vehicle.

**[0020]** FIG. 1A shows a plan view of an automotive vehicle floor mat 100 according to embodiments of the present invention. The automotive vehicle floor mat 100 may be configured to be arranged on the floor of an automotive vehicle. In most automotive vehicles, the floor is comparatively flat near the front seats but ramps upward toward the front of the vehicle. Accordingly, as shown in FIG. 1A, an automotive vehicle floor mat 100 according to embodiments of the present invention may comprise a base portion 101 formed as a ramp portion 102 and a flat portion 103. The base portion 101 may comprise an insert area 104 configured to receive an insert material. Though FIG. 1A shows an insert area only in the flat portion, as shown in subsequent figures, an insert area may also be formed in the ramp portion. The ramp portion 102 and flat portion 103 may be formed so that when the automotive vehicle floor mat 100 is arranged in a vehicle, the ramp portion 102 may substantially lie over the ramped area of the vehicle floor while the flat portion 103 may substantially lie over the flat area of the vehicle floor. To this end, a width  $W_R$  of the ramp portion in at least a region thereof may be less than a width  $W_F$  of the flat portion, so that the ramp portion fits comfortably in the ramped

area, for example under the operating pedals. However, embodiments of the invention are not limited to such a configuration and could take any number of forms, including forms with curved edges. The mat could be sold in a form that could be adaptable to various vehicles by cutting away or otherwise removing excess mat material.

**[0021]** As shown in FIG. 1C, an automotive vehicle floor mat 150 according to embodiments of the invention need not include a ramp portion, and instead may simply comprise a base portion 101 with an insert area 104.

**[0022]** Referring to the perspective view of FIG. 1B, the automotive vehicle floor mat 100 may further comprise an insert material 105 configured to be received within the insert area 104. The insert material may be any one of, or any combination of: tacky; porous; water-absorbing; water-dissipating; water-wicking; and tacky both when wet and when dry. The insert material could be transparent, semi-transparent or tinted. The insert material could be cleanable.

**[0023]** As discussed above, according to embodiments of the present invention, a non-tacky area may be arranged within the insert area so as to be bordered by or adjacent to the insert material when the insert material is received within the insert area. A location of the non-tacky area may depend at least in part on where a person's feet are likely to be when in an automotive vehicle. Such a configuration could enable an insert material to effectively trap dirt, while not impeding a driver's feet or passenger's feet, due to excessive tackiness of the insert material in an area where the driver's or passenger's feet will primarily rest when in the vehicle.

**[0024]** For example, an embodiment 200 of an automotive vehicle floor mat according to the present invention as shown in FIG. 2A may comprise an area 201 for receiving an insert material that occupies most of the upper surface area of the base portion 101. A non-tacky area 202 may be arranged in a location where a person's feet might primarily rest when the mat is in place in a vehicle, and thus may be referred to herein as a "heel pad." For example, in FIG. 2A, the non-tacky area 202 is in the flat portion near the ramp portion. The non-tacky area 202 may have a non-tacky upper exposed surface, to reduce the likelihood of the movement of a person's feet being impeded. The base portion may be formed to provide a border 203 for the insert area 201. The base portion could comprise, for example, carpet with a portion thereof

compressed to form the insert area, and with the uncompressed portion forming the border. The heel pad 202 could also be formed by an uncompressed portion of the carpet.

**[0025]** As shown in a perspective view in FIG. 2B, the automotive vehicle floor mat 200 may further comprise an insert material 205 configured to be received within the insert area 201. To this end, for example, the insert material 205 may have a shape corresponding to the insert area 201, and accordingly include an opening 206 therein to accommodate the heel pad 202 when received within the insert area 201.

**[0026]** FIG. 3 shows an automotive vehicle floor mat embodiment 300 according to the present invention with a non-tacky area 302 that extends substantially across the length of the flat portion 103. The mat 300 may include an insert area 301 adjacent to the non-tacky area 302 in the flat portion 103 and in the ramp portion 102. Although a perspective view as in FIGs. 1B and 2B is not shown, it should be understood that the automotive vehicle floor mat of FIG. 3 may include an insert material configured to be received within the insert area 301. For example, the insert material may have a shape corresponding to the insert area 301.

**[0027]** As discussed above, embodiments of the invention may comprise an insert material having a surface comprising areas with varying degrees of tackiness, where a degree of tackiness in a given area depends at least in part on where a person's feet are likely to be when in an automotive vehicle. As with the insert area including a non-tacky area as discussed above in connection with FIGs. 2A, 2B and 3, such a configuration could enable an insert material to effectively trap dirt, while not inhibiting the free movement of a driver's feet or passenger's feet. For convenience, areas of varying tackiness on a surface of an insert material will be referred to herein in terms of a "passive" portion and an "active" portion. The active portion may be more tacky than the passive portion.

**[0028]** FIG. 4 shows an automotive vehicle floor mat 400 according to embodiments of the invention comprising a passive portion 401 and an active portion 402. Here and in embodiments discussed below, the passive and active portions could be provided in an insert material configured to be received within an insert area of the base portion 101. In mat 400, the passive portion 401 extends into both the ramp portion and the flat

portion. More specifically, the passive portion 401 may be formed to cover substantially all of the ramp portion 102 and extend into the flat portion 103.

**[0029]** FIG. 5 shows an automotive vehicle floor mat 500 according to embodiments of the invention comprising a passive portion 501 that extends across substantially all of the ramp portion 102 and the length of the flat portion 103. An active portion 502 is adjacent to the passive portion 501 and laterally offset from the ramp portion.

**[0030]** FIG. 6 shows an automotive vehicle floor mat 600 according to embodiments of the invention comprising a passive portion 601 formed as a "heel pad" along the lines discussed above. The ramp portion 102 and flat portion 103 may be substantially covered by an active portion 602.

**[0031]** FIG. 7 shows an automotive vehicle floor mat 700 according to embodiments of the invention comprising a passive portion 701 that extends substantially across the length of the flat portion 103. An active portion 702 is adjacent to the passive section 702 and also covers substantially all of the ramp portion 102.

**[0032]** FIG. 8 shows an automotive vehicle floor mat 800 according to embodiments of the invention comprising a base portion 101 having a non-tacky area 801, provided by a material such as carpet, that extends into both the ramp portion and the flat portion. More specifically, the non-tacky area 801 may cover substantially the entirety of the ramp portion 102 and extend across the length of the flat portion 103. An insert area 802 may be formed in the base portion to receive an insert material. The insert area 802 may be laterally offset from the ramp portion, so as to leave a continuous extent of non-tacky area 802 under a driver's or passenger's feet most of the time.

**[0033]** As shown in FIGs. 9A and 9B, a passive portion 901 of an insert material may be formed to cooperate with a plurality of flexible protrusions or "nipples" 902 formed in the base portion. The nipples may be clustered sufficiently densely to inhibit a person's shoes from coming into direct contact with the adhesive of the passive portion, to allow free movement of the shoes over the passive portion. At the same time, the adhesive of the passive portion may act to trap dirt particles falling between the protrusions. The passive portion of the insert material may have a plurality of apertures therein corresponding to the protrusions.

**[0034]** FIG. 10 shows an automotive vehicle floor mat 1000 according to embodiments of the invention that includes an anti-slip feature for reducing the possibility of a person's feet slipping on the floor mat when entering or exiting an automotive vehicle when it or the person's feet are wet. The anti-slip feature of the floor mat 1000 could include a structural member associated with the base portion 101, such as a protrusion formed in or on or otherwise associated with the base portion. Such a protrusion could be formed as, for example, a tread or nipple. A tread could have any size or shape; for example, the treads could be elongated or nodular (bump-like). The protrusions could be formed in the insert area of the base portion and designed to be received within apertures of an insert material when the insert material is placed in the insert area. Referring to FIG. 10, an example is shown of nodular treads 1002 in an insert area 1001. Corresponding apertures 1003 may be formed in an insert material 1004 to receive and engage the treads 1002. The treads may extend beyond a top surface of the insert material when the insert material is placed in the insert area, to provide a frictional resistance to shoe surfaces coming in contact therewith. The treads may also serve as alignment guides to ensure correct installation of an insert material in the insert area.

**[0035]** The anti-slip feature could include anti-slip properties of the insert material. The anti-slip properties could be provided by any kind of material property of, or discontinuity or irregularity in a surface of, the insert material, including any one of, or any combination of: a tacky-when-wet composition; particles; apertures; channels formed of a non-tacky material; raised portions or bumps in the insert material; indentations or recesses in the insert material; and strips of high-friction material adhered to the insert material.

**[0036]** Referring to FIG. 11A, as noted earlier, an insert material may comprise a plurality of separable, disposable layers or sheets formed as a stack 1100, the stack having a top layer or sheet 1100.1 and a bottom layer or sheet 1100.3, and intermediate layers 1100.2 therebetween. Each layer or sheet may have a top tacky surface. Sheets of the tacky insert may be removed and disposed of one by one as they are used over time. The bottom layer or sheet 1100.3 may have adhesive on a lower surface thereof, as well as its top surface, in order to secure the stack of sheets within

an insert area of a base portion by adhesive engagement with an upper exposed surface of the insert area. The bottom layer and the top layer of the stack may have release layers 1100.8 and 1100.7, respectively, of non-tacky material, such as paper or plastic, adjacent thereto or otherwise associated therewith, to enable easy handling of the stack before it is installed in the insert area. The release layers may be removed, e.g., peeled away, when the stack is installed in the insert area.

**[0037]** According to embodiments, as shown in FIG. 11B, a layer 1100.1, 1100.2, 1100.3 of insert material may comprise an upper, porous part 1100.11, a water-absorbing part 1100.12, and a water-resistant underlining 1100.13. Such a combination of materials could act in a way similar to the way a diaper works, with the porous part allowing water to be transmitted from an upper surface thereof to the water-absorbing part, while the water-resistant underlining could block moisture from passing through to adjacent insert material layers.

**[0038]** As shown in FIG. 11C, the porous part 1100.11 and water-absorbing part 1100.12 need not be separate components. Instead, the porous part 1100.11 could itself be water-absorbing; in such an embodiment, a separate water-absorbing part 1100.12 may not be included. Further, the porous, water-absorbing part 1100.11 could have a tacky surface. Such a porous, water-absorbing material with a tacky surface could be formed, for example, by applying an adhesive to a water-absorbing material having a substantially coarse texture or weave, so that applying the adhesive did not clog or block small openings or pores distributed through the material. Alternatively, a non-porous tacky surface could first be applied to the water-absorbing material and pores could be formed in the tacky surface thereafter. The water-resistant underlining 1100.13 could be formed as, for example, a thin film comprising plastics, including polymers such as polyester, polyethylene, or polypropylene. Additionally or alternatively, the thin film could comprise rubber or rubber-like materials such as silicone rubber, polyurethane, or latex.

**[0039]** As further shown in FIG. 11A, in embodiments, individual layers of an insert material comprising a plurality of layers could have remove tabs 1105. A remove tab 1105 may facilitate easy removal of a layer of the insert material by enabling a user to grasp the remove tab and thereby apply a separating force to the layer. The remove tab

could be formed of the same material as the insert material but without any adhesive thereon, to enable easy handling. The remove tab could alternatively be formed from a different material and fastened to the insert material. In embodiments, remove tabs could have a non-smooth texture, or could have a separator material associated with a portion of thereof, so as to enable one tab to be more easily differentiated from and separated from another, and consequently, an individual layer of an insert material to be more easily separated from other layers. Remove tabs could be colored. For example, remove tabs in a stack of insert layers could have alternating colors, or each could have a different color. Remove tabs in a stack of inserts layers could be numbered or lettered, for example in a recognized sequence such as (1, 2, 3 ...) or (A, B, C...). Remove tabs or portions thereof could be offset from each other in stack of insert layers, to enable easier tab separation.

**[0040]** The insert material could include plastics such as polyethylene, polypropylene, bi-directional or bi-axially oriented polypropylene, polyvinyl chloride, polystyrene, polyester, polyolefin, and various blends or co-polymers of this kind. The insert material could be transparent or semi-transparent and include such materials as hydrophilic aliphatic acrylic polymers and copolymers incorporating acrylic acid, hydroxy ethyl methacrylate, glycerin monomethacrylate, blends of a noncross-linked hydrophilic thermoplastic, preferably a polyethylene glycol diacrylate with  $n$  not exceeding 15, and a hydrophobic material, such as a polyvinyl neoprene chloride. The insert material could include paper or a paper-like material, fabrics of various kinds, and other porous, water-absorbing materials. A surface of the insert material could be printed.

**[0041]** Further, the insert material may be provided with a non-smooth texture on a top surface thereof. This may be done because if the insert material has a substantially smooth top surface, an undesirable glare or shine may be created by light reflected from the surface, since a smooth surface tends to reflect light in a given predominant direction. The glare or shine may reduce the cosmetic appeal of a floor mat including the insert material. A non-smooth texture may further help to reduce the possibility of slipping on the insert material. "Non-smooth texture" means that at least a portion or substantially all of a surface of the insert material includes areas of differentiated height, i.e., areas that are either raised or recessed in comparison to adjacent areas. Thus,

visually and in terms of feel, the surface could be characterized, among other ways, as "irregular," "bumpy," "rough" or "grainy." An example of a non-smooth texture 1115 is shown in FIG. 11D, where the non-smooth texture includes raised areas or bumps 1120.

**[0042]** Tackiness of the insert material could be provided by any of a variety of materials, such as polyvinyl chlorides combined with a suitable plasticizer, plasticized neoprene, polysulfides, and polyurethanes. Additionally, acrylics, such as butyl acrylate and many of its homologues, may be utilized. However, the present invention is not limited to any particular material. Tackiness could be provided by any adhesive composition. As noted earlier, the insert material could be tacky both when wet and when dry. This property might be provided, for instance, using adhesive compositions of one type that are optimally adhesive when dry, and adhesive compositions of another type that are optimally adhesive when wet. An example is a material comprising polymers, such as block copolymers or a grafted copolymer. The polymers could be pressure-sensitive adhesives coated or grafted with hydrophilic monomers followed by a further grafting of a fluoroacrylate. Such a material could be capable of absorbing water while retaining tackiness.

**[0043]** According to embodiments, the base portion 101 may comprise a tough rubber or rubber-like material such as PVC, neoprene or santoprene, acting as an underlayer to contact a floor or floor covering of an automotive vehicle. The underlayer of the base portion could include frictional members such as small protrusions or adhesive strips or pads to engage a floor or floor covering, such as carpet, of an automotive vehicle, to reduce possible slippage of the automotive vehicle floor mat within the vehicle. According to embodiments, an upper exposed surface of the base portion 101 could comprise carpet, with an insert area formed therein. The insert area could be formed, for example, by a process known as "thermoforming." In such a thermoforming process, pressure and heat may be applied to the carpet to compress it, thereby forming a recess having a shape adapted to receive an insert material with a corresponding shape. Portions of the carpet could be left uncompressed during the thermoforming process. These uncompressed portions may form anti-slip members associated with the base portion as discussed above, by projecting through

corresponding apertures of an insert material and presenting a textured surface to engage the soles of shoes.

**[0044]** Referring to FIG. 12, an automotive vehicle floor mat 1200 according to embodiments of the invention could include a smooth overlay 1201 adapted to be received within an insert area 1202 and arranged between an upper exposed surface of the insert area and an insert material 1205. For an insert area 1202 formed from thermoformed carpet, for example, such an overlay could provide for improved contact with an adhesive lower surface of the insert material 1205 and easy release of the insert material when it is to be replaced. The overlay 1201 may be transparent or semi-transparent transparent to allow an underlying color and/or pattern of the insert area to be seen. The overlay could be printed with some text, decorative pattern or the like. The overlay could include apertures 1204 for receiving and engaging uncompressed portions of carpet 1203, or anti-slip members otherwise implemented, in the insert area. The insert material 1205 could also include apertures 1206 for receiving and engaging uncompressed portions of carpet 1203.

**[0045]** As shown in FIG. 13, according to alternative embodiments of the present invention, a portion of material may be removed from a base portion 101 to form a cut-out area 1301 as an insert area. An insert material 1302 comprising a stack of layers may be configured for use with a base portion having such a cut-out insert area, by providing a base layer 1303 for the stack of layers that is larger than the cut-out insert area 1301. The other layers may be sized to fit through the cut-out area 1301. In this way, when the base portion and insert material are arranged in an automotive vehicle, the base portion material around the cut-out area may act to secure the insert material in place by pressure against the base layer 1303 of the insert material. Further, this configuration may facilitate folding of the base portion, providing for a small point-of-purchase footprint.

**[0046]** FIG. 14A shows an example of an automotive vehicle floor mat 1400 according to embodiments of the present invention arranged in an automotive vehicle. As shown, when arranged in an automotive vehicle, the ramp portion 102 of the mat 1400 may lie over the ramped part 1405 of the vehicle toward the front of the vehicle, while the flat portion 103 may lie over the flat part 1410 of the vehicle in front of the

seats 1415. As can be seen, an insert material 1401 in an insert area of the mat may be able to effectively collect dirt from a person's shoe. To this end, the insert area may be of at least a size able to accommodate an adult shoe. FIG. 14B shows a user grasping a remove tab 1425 to remove the insert material 1401 from the mat.

**[0047]** An automotive floor mat according to alternative embodiments of the invention is illustrated in FIG. 15A. The mat 1500 may comprise a base portion 1501 having an attachment mechanism 1503 enabling the mat to be attached to an existing floor mat 1505, thus providing an insert area for a removable dirt-trapping insert material 1502 to the existing floor mat. The attachment mechanism 1503 may comprise, for example, an extent of a flexible material connected to the base portion. The extent of material may have a fastening mechanism 1504 associated therewith, to engage a corresponding mechanism (not shown) on the existing floor mat 1505. The fastening mechanism 1504 could be, for example, a strip of the hook portion of a hook-and-loop fastening arrangement. A strip of the loop portion of the hook-and-loop fastening arrangement could be adhered, for example, to the underside of the existing mat. To use the mat 1500 with the existing mat, the extent of material 1503 could be placed on the underside of the existing mat, and fastened to the underside of the existing mat using the fastening mechanism 1504. For example, for a fastening mechanism 1504 formed as a strip of the hook portion of a hook-and-loop fastening arrangement, the fastening mechanism 1504 could be pressed into a strip of the loop portion of the hook-and-loop fastening arrangement adhered to the underside of the existing mat.

**[0048]** FIG. 15B shows a plan view of the mat 1500. The mat could include anti-slip members 1506 in an insert area thereof. The insert material 1502 could have a remove tab 1507 on two ends thereof, to facilitate easy removal of the insert material.

**[0049]** Embodiments of the invention could further include a "gutter-like" area for capturing dirt that does not adhere to the insert material.

**[0050]** Several embodiments of the present invention are specifically illustrated and/or described herein. However, it will be appreciated that modifications and variations of the present invention are covered by the above teachings and within the purview of the appended claims without departing from the spirit and intended scope of the invention.